A Case for Adopting Fatigue Risk Management Systems at Sea

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Presentation Overview

Background: What has been done
- FASTOH
- Beyond the midnight Oil

Setting the scene:
- Fatigue science; and
- Safety science

Fatigue Risk Management Systems
- Fatigue in Shipping: Quick review
- Current Approaches

Way Forward: Paving the way for a Human Element Strategy
Human Factors Section: Working Model

Current Projects:
- Safety Culture
- HCD (ENAV) performance measures
- System Safety (systematic reporting and analysis frameworks)
- Fatigue (FRMS)
Navigating the Safety Space

Source: James Reason (1997)

Initiated by AMSA (through QUT)
Australian seafarers (5,500; 36% Response rate):

- Smoked, drank, ate more sugar and fat and exercised less than the Australian population;
- Majority (70%) reported poor sleep quality at sea;
- 50% reported less than 6 hours of daily sleep at sea
- 80% reported occasional to frequent stress on the job.

http://officerofthewatch.com/2012/04/22/seafarers-health-lifestyle/

Summary of selected sleep, stress and relaxation habits at sea and ashore (QUT, 1997)
Examination of issues such as:

- work scheduling and sleep;
- the home/work interface; and
- habitability (referred to as environmental hardship).

Awareness of benefits to overall health:

- better nutrition:
- exercise; and
- reduced alcohol and nicotine consumption.
After FASTOH……

- Submitted as INF (MSC70/INF.2) paper to the IMO (was well received);
- Some issues with implementation at the time;
- Seafarers Assistance Service increased following release of FASTOH;
- Some companies reviewed their policies on nutrition and exercise and initiated lifestyle awareness programs;
- Habitability issues: Some considered within current MLC
- **Provides a benchmark for future studies**
‘Beyond the Midnight Oil’ (2000)

Senate Enquiry

TOR included:

• Consequences of fatigue in air, sea, road and rail transport;
• Initiatives in transport addressing the causes and effects of fatigue;
• Ways to achieve greater responsibility by individuals, companies, and governments to reduce the problems related to fatigue in transport.

@http://www.earthlyissues.com/exxon.htm
Issues and Recommendations: Maritime

Issues:
- Turn around times for ships
- Decrease in the size of ship crew

Recommendations:
- Emphases was on costal pilotage;
- 17: investigate the risk to crew and public safety of quick turnaround times in port and consider whether it is appropriate to regulate for adequate rest times in port for seafarers;
- 32: develop sector specific Australian Standards for Safety, incorporating fatigue management principles;
Current Approach to Fatigue Management

- **Guidelines on Fatigue**
- **International Maritime Organization**
  - Standards of Training Certification and Watchkeeping for Seafarers
  - Maximum Hours (14 hours/24 hour period) - max 72hrs/7days
  - Minimum Rest (10 hours/24 hours period) - min 77hrs/7days
- **International Labour Organization**
  - Maritime Labour Convention
- **AMSA MO28 (and MO 11)**
Setting the Scene: Fatigue Science

- **Hours of Wakefulness**
  - 18h awake (0800-0200h) ≈ BAC 0.05%
  - 24h awake (0800-0800h) ≈ BAC 0.08%
  - Extended hours are not uncommon at sea

- **Time of day (circadian rhythms)**
  - Circadian drive during day-time and night-time
  - Night work challenges circadian clock (sleep at night, stay awake during day)
Fatigue Science: Sleep Debt

Fatigue Science: Performance vs Alertness

Fatigue Science: How long does it take to recover?

- 5 nights of 4h sleep
  - >1 night of 10h sleep needed
- 7 nights of 3h sleep
  - >3 nights of 8h sleep needed
- Recovery of mood may occur at different rates

Banks et al., (2010)
# Fatigue: Myth and Reality

<table>
<thead>
<tr>
<th>Myth</th>
<th>Reality</th>
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<tbody>
<tr>
<td>Five or six hours sleep a night is generally enough</td>
<td>Very few people can manage on this amount of sleep without being seriously effected</td>
</tr>
<tr>
<td>Daytime sleep is just as good as nighttime sleep</td>
<td>Shiftworkers who have to sleep during the day generally get lower-quality sleep, and less of it</td>
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<tr>
<td>We can judge how fatigued we are accurately</td>
<td>Studies have shown that fatigued people often don’t realise that their abilities are impaired by fatigue</td>
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<tr>
<td>We need less sleep as we get older</td>
<td>We still need the same amount of sleep, but our sleep becomes more fragmented, and we tend to wake earlier</td>
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Fatigue in Shipping: Risk Factors

- Hours of wakefulness ↑;
- Night time;
- Chronic sleep restriction (lack of restorative sleep);
- Work demands (duration, intensity and complexity, too low and too high are the most difficult);
- Age and general levels of fitness;
- Environmental: noise, temp, vibration, light, ship motion, etc.
- Non-work factors such as sleep disorders;
- Experience: errors are more common with less

Sleep science makes it very clear that sleep is not a tradable commodity

Fatigue: Consequences and Impact

- Slowed reaction time
- Reduced vigilance
- Memory lapses
- Inattention to tasks
- Complacency
- Lack of awareness, communication and Judgment
- Decline in motivation
- Micro-sleeps

- Long term health issues (obesity, cardiovascular, gastrointestinal, diabetes)
- Morale, absenteeism and turn-over
- Health-injuries, sleep disorders
- Lost productivity
- Equipment and property damage
- Work cover claims

Fatigue is a safety and welfare issue
Why Fatigue Risk Management Systems?

- Fatigue still remains a major concern at sea;
- Fatigue is an occupational health and safety (and welfare) issue, a commercial issue, a public safety issue and, at times, an environmental issue;
- Fatigue probably cannot always be avoided, but it can be managed;
- People not always best judges of their ability during chronic sleep loss;
- Every operation is different; each individual is different;
- Require ‘safe manning’ guidelines operational support.
FRMS – What is it?

- Based on scientific principles, knowledge and operational experience
- Provides a layered system of defenses to minimize risks of fatigue. [Gander et al, p. 578].

Includes:
- risk assessments;
- risk mitigation and control strategies;
- education and awareness;
- monitoring systems;
- continual adaptation processes
FRMS and Safety Science

- Increased understanding of human error (in other industries..)
- No longer is it a cause
- It is not random
- It is systematically connected to features of people’s tools, tasks, and operating environment
- Starting point for a study/investigation, **not the conclusion**
Fatigue Risk Management System: Strategy of Work

S1: Fatigue Risk Management Guidelines
- S1.1: Ensure fatigue risk management guidance at all levels
- S1.2: Engage with stakeholders and communicate guidance
- S1.3: Provide legislative framework for effective control of fatigue risks

Guidelines and Communication
- Develop fatigue risk management guidance for (1) seafarers; (2) shipowners/operators and (3) maritime regulators
- Adopt a collaborative approach with stakeholders
- Develop a regulatory policy based on fatigue scientific evidence

S2: Fatigue Risk Management Educations and Training
- S2.1: Ensure fatigue awareness and knowledge at the seafarer, ship management and regulatory level

Training
- Develop fatigue related training for: (1) seafarers (2) shipowners/operators and (3) maritime administrations

S3: Optimise Work and Rest Scheduling at Sea
- S3.1: Ensure sufficient sleep and rest opportunities
- S3.2: Ensure schedules are designed to reduce fatigue risks
- S3.2: Ensure sufficient crewing levels

Enablers
- Develop validated and calibrated maritime specific fatigue modelling tools (i.e. MARTHA, FAST)
- Research to develop crewing/workload modelling framework (supporting Safe Manning Guidelines)

S4: Fatigue Assessment, Monitoring and Feedback
- S4.1: Monitor fatigue information, identify trends
- S4.2: Ensure a ‘healthy safety culture’ is adopted

Plans
- Expand incident and near miss reporting systems to capture fatigue related risks and errors
- Management System
- Assess determinants of safety culture in shipping

S5: Sufficient Work and Living Environment
- S5.1: Ensure sufficient workplace environment to promote alertness

Support
- Develop ‘shipboard workplace design’ guidelines to promote alertness

Approve and Monitor Systems for Management of Fatigue Risks
Fatigue Risk Management System: Proposed Approach

0-1 year
- Commence review of IMO Fatigue guidelines
- Proposal development and planning
- Stakeholder participation
- Industry Consultation
- Review existing literature
- Initial Data Collection
- High-Level Planning

1-2 years
- Develop IMO fatigue guidelines and training packages
- Industry Consultation
- Continue data collection
- Analyses
- Reporting
- Implementation of customised pilot FRMS

2-3 years
- Develop customised FRMS
- Develop regulatory support
- Industry Consultation
- Continue data collection
- Analyses success of intervention
- Reporting
- Implementation

3+ years
- Global (IMO) rollout strategy
- Continuous development
- Industry Consultation
- Support other knowledge gaps
- Implementation
Approach and Way Forward

- INF paper submitted to IMO, HTW1 sub-committee on FRMS (explored support);
- Most countries approached interested/favourably disposed towards an Australian initiative;
- Submission for planned output (part of IMO high level action plan) at MSC 94 to consider at HTW (2);
  - initial focus will be on revising the current IMO fatigue guidelines;
  - draft paper planned for July 2014 with industry consultation.
To Conclude: An FRMS

- provides a proactive & flexible approach to reduce risks of fatigue;
- aims for continuous improvement;
- premise is on owners/operators (and seafarers) ‘duty of care’ obligations and shared-responsibility;
- satisfactory level must be equal to or greater than the level provided by prescriptive schemes;
- **Note:** FRMS started to be included as a risk grading for insurance purposes.

Alert! – Issue 13 on Fatigue

Its an evolution not a revolution
Questions

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